Investments

CAPM performance, Value and Momentum

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Overview

- Last time
  - CAPM: same beliefs → market = tangency portfolio
  - Greatly simplifies portfolio/discount rate problems
  - Also useful for performance analysis

- Today
  - How well does the CAPM explain returns in practice?
    - Not very well
  - Then what explains differences in returns across securities?
    - Size—small stocks have higher returns than large stocks
    - Value—value stocks have higher returns than growth stocks
    - Momentum—stocks that did well in the past do well in the future

Testing the CAPM

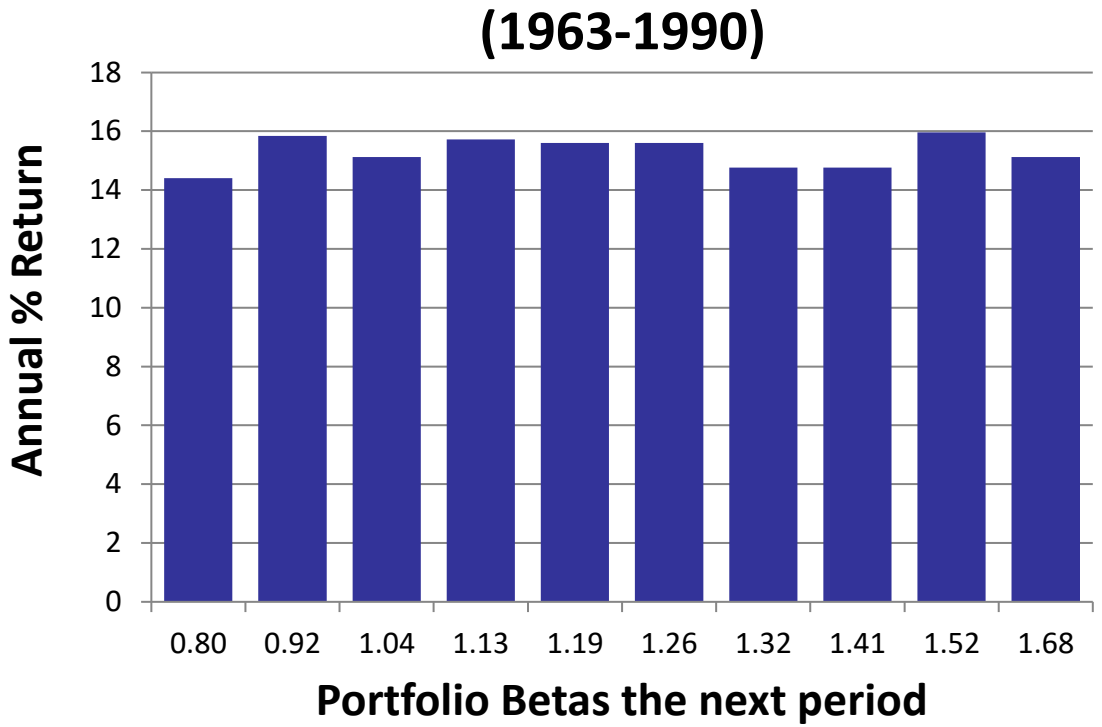
- What should we expect if CAPM is true?
  - E[r] are a linear function of β and the market risk premium
  - Only β explains expected returns
- Caveat: the Roll critique
  - What if you find that β (and only β) explains returns?
    - How do you know your market proxy is "the market"?
  - What if β doesn't explain returns?
    - You may just have a bad market proxy.
- Still, CAPM tests check efficiency of the market proxy

Fama and French (1992)

- Form 10 portfolios on the past 5-year's Beta
- Look at Next year's Return

- High beta stocks earn no higher return than low-beta stocks.
- Beta is DEAD!

In 1926-3/2012 period, Frazzini and Pederson (2013 JFE) show low-beta stocks earn 10.9% pm vs. 11.64% for high-beta stocks.



Why doesn't beta work?

- Wrong theory
  - Behavioral biases
  - No relation between return and marginal risk
  - Friction-less market assumption in CAPM invalid.
    - Leverage? Non-tradable risks?
- Wrong test
  - Tests don't capture the correct market portfolio
  - If you had the right portfolio, you'd see the risk priced

- Frictions (leverage, non-tradable risks) are likely an important part of the explanation.

- CAPM failure has motivated search for other risk factors
  - In practice leads to wide-spread adoption of multi-factor models, whose basis is the APT (coming soon).

So what did the CAPM teach us?

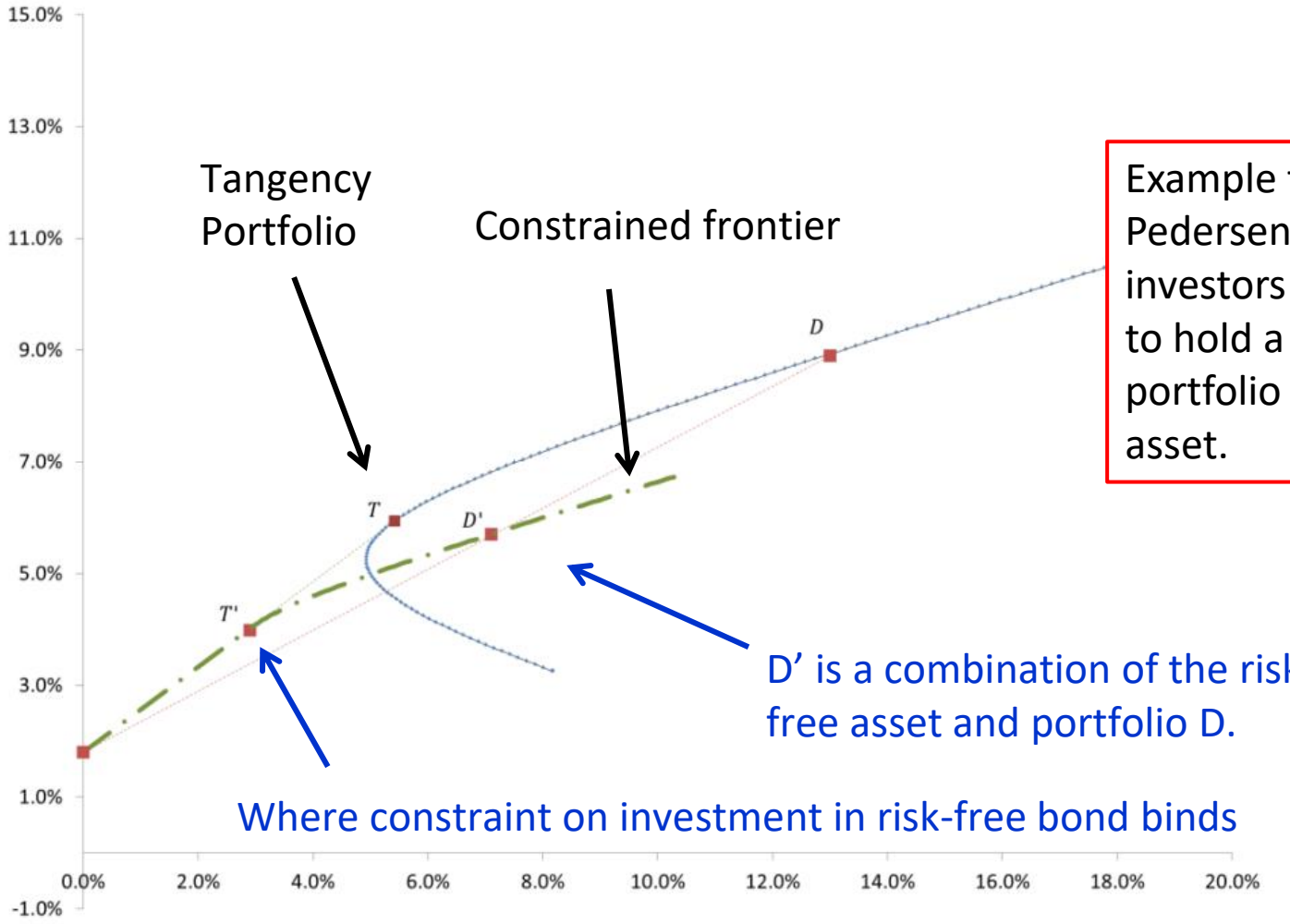
- We learned what is meant by a "priced" risk factor
  - If a risk factor is "priced", that means that investors require compensation for exposure to the factor.
  - Thus, variation in betas on a priced risk factor should explain expected returns.
    - This is how Fama, French (1992) tested the CAPM

- The theory is appealing and may work in the future
  - Do you really think market exposure is not risky?
    - Seems likely that asset managers with high beta portfolios going into the 2008/2009 crisis think beta is risky today.
  - What happens if everyone realizes that high-beta securities do not have higher expected returns?
- Despite empirical shortcomings … the CAPM is still widely used in practice.

The leverage explanation?

- We have assumed investors can leverage the tangency portfolio.
- Black (1972 JB) argues that one explanation for a flatter-than-CAPM relationship between Beta and expected return is borrowing constraints.
  - Investors that want high returns but have borrowing constraints will hold high standard deviation portfolios with lower Sharpe ratios than the tangency portfolio.
  - With borrowing constraints, “model predicts only that the slope of the line relating expected returns and beta is positive”
- Frazzini, Pedersen (2013 JFE) extend and test this idea in detail.

Portfolio selection with constraints



Example from Frazzini, Pedersen where some investors are constrained to hold a fraction of their portfolio in the risk-free asset.

D' is a combination of the risk-free asset and portfolio D.

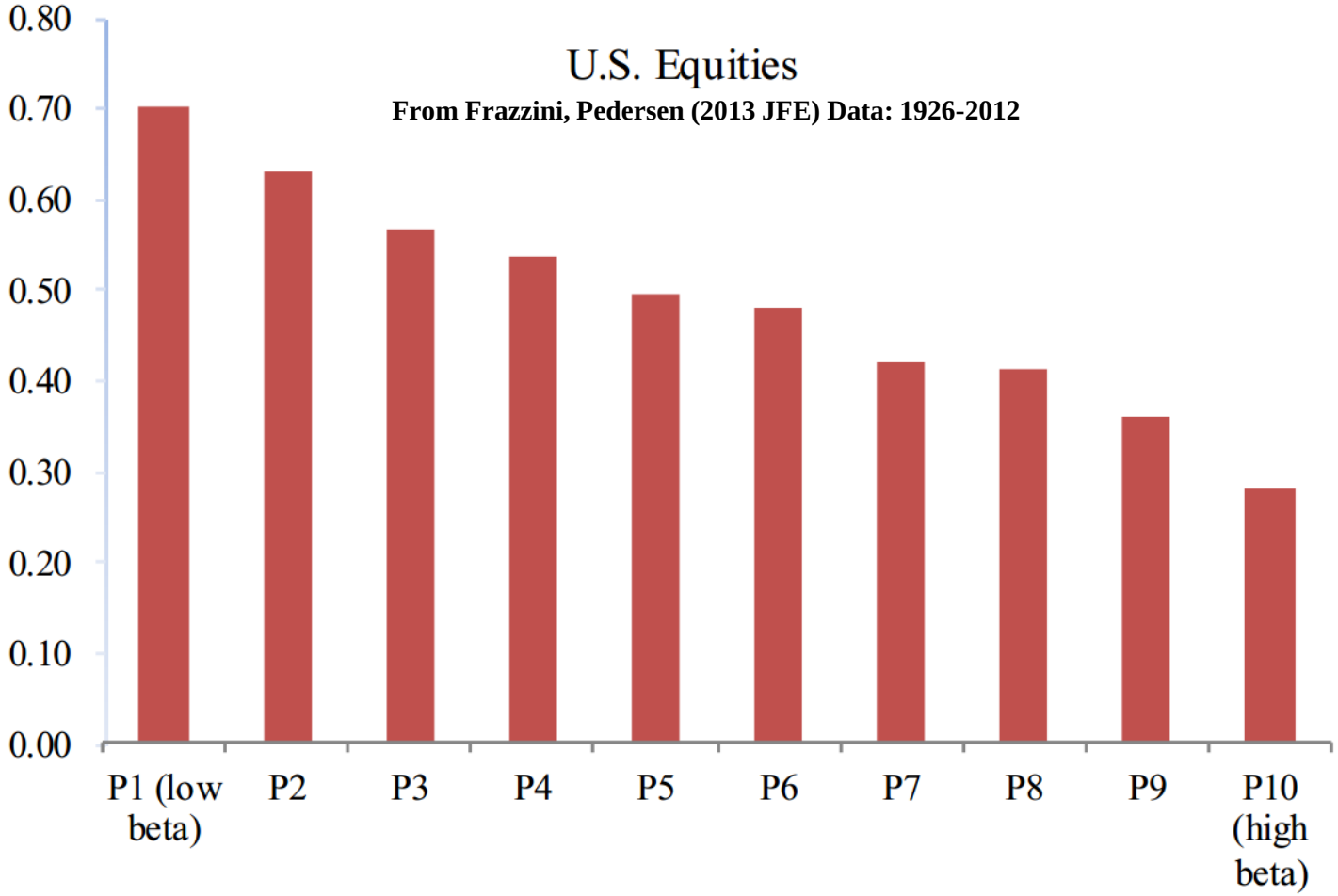
Where constraint on investment in risk-free bond binds

“Betting on Beta”

- Title of Frazzini, Pedersen (2013 JFE) paper.
  - Maybe leverage-constrained investors bid up the price of high-beta stocks, lowering their expected returns.

- Black (1992 JPM)
  - “… if the line is really flat, that implies dramatic investment opportunities for those who use beta. A person who normally holds both stocks and bonds or stocks and cash can shift to a portfolio of similar total risk but higher expected return by emphasizing low-beta stocks.” pg. 75

Sharpe ratios of Beta-sorted Portfolios



Betting on Beta cont'd

- So unconstrained investors could leverage low-beta securities and earn better risk-adjusted returns.
- Frazzini, Pedersen find the result (low-beta SR > high-beta SR) in a variety of asset classes.
  - US/Int. Equities, Gov/Corp. bonds, futures.
- Is the market inefficient? Or maybe just constrained?

If β doesn't work, does anything?

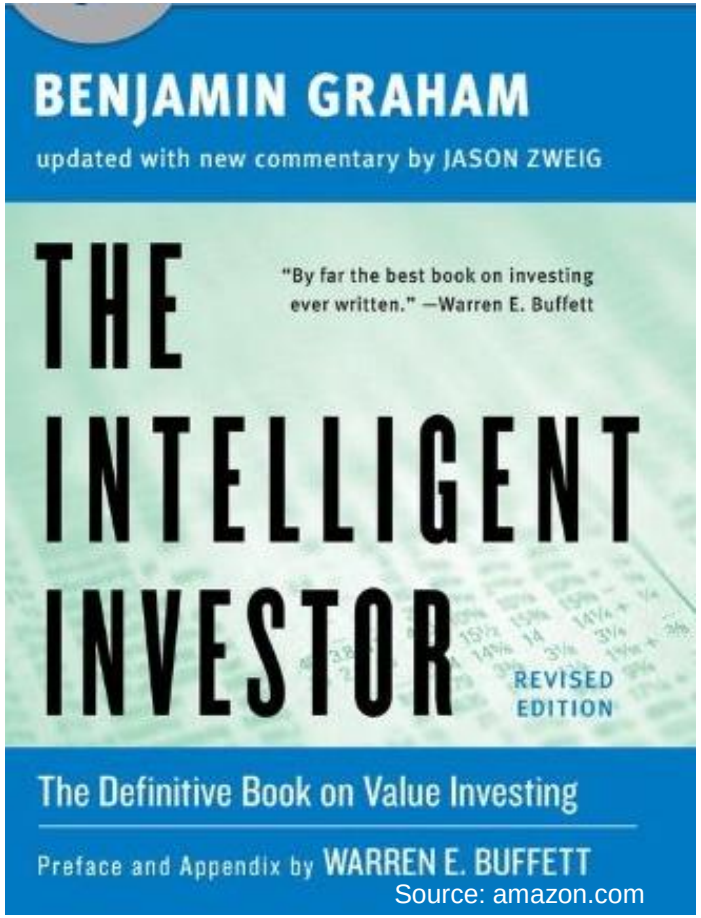
- A primary motivation for CAPM is identifying expected returns and discount rates.

- While β does not explain returns, certain stock characteristics are consistently related to future returns:
  - Small stocks earn higher returns
    - Banz (1981); Fama, French (1992)
  - Value stocks earn higher returns
    - Basu (1977); Fama, French (1992); Lakonishok, Shleifer, Vishny (1994)
  - Stocks with high past returns have high future returns
    - Jegadeesh, Titman (1993); Jegadeesh, Titman (2001)

Value Investing

- Value investing is an idea developed by practitioners.
  - Ben Graham credited as the father of value investing.
  - Warren Buffet most famous pupil.

- Essential idea is like PV analysis
  - Buy stocks with market prices lower than discounted value of cash flows.
  - Ben Graham, for example, would try to buy stocks with prices < liquidation value.
  - Many implementations involve buying stocks with low P/B (or high B/M) ratios.



Source: amazon.com

More about Fama & French (1992)

- Fama & French published comprehensive study of relations between accounting value of equity (book) and market value (B/M ratio) and future returns
  - They controlled for other phenomena such as P/E, size, financial leverage, & beta
- Key result: high B/M (value) stocks easily outperformed low B/M (growth) stocks
- Small Stocks earned more than large stocks
  - AND beta, P/E, leverage became redundant
- What does this finding really mean?

Returns, sorts by ME and BE/ME FF '92

Small-cap Value

	Book-to-Market Portfolios										
	All	Low	2	3	4	5	6	7	8	9	High
All	1.23	0.64	0.98	1.06	1.17	1.24	1.26	1.39	1.40	1.50	1.63
Small-ME	1.47	0.70	1.14	1.20	1.43	1.56	1.51	1.70	1.71	1.82	1.92
ME-2	1.22	0.43	1.05	0.96	1.19	1.33	1.19	1.58	1.28	1.43	1.79
ME-3	1.22	0.56	0.88	1.23	0.95	1.36	1.30	1.30	1.40	1.54	1.60
ME-4	1.19	0.39	0.72	1.06	1.36	1.13	1.21	1.34	1.59	1.51	1.47
ME-5	1.24	0.88	0.65	1.08	1.47	1.13	1.43	1.44	1.26	1.52	1.49
ME-6	1.15	0.70	0.98	1.14	1.23	0.94	1.27	1.19	1.19	1.24	1.50
ME-7	1.07	0.95	1.00	0.99	0.83	0.99	1.13	0.99	1.16	1.10	1.47
ME-8	1.08	0.66	1.13	0.91	0.95	0.99	1.01	1.15	1.05	1.29	1.55
ME-9	0.95	0.44	0.89	0.92	1.00	1.05	0.93	0.82	1.11	1.04	1.22
Large-ME	0.89	0.93	0.88	0.84	0.71	0.79	0.83	0.81	0.96	0.97	1.18

Large-cap Growth

Is Value Risk?

- Maybe value is a risk factor
  - For example, distress risk
  - Fama and French argue value stocks and small-cap stocks are riskier.
    - DFA: “Many economists believe small cap and value stocks outperform because the market rationally discounts their prices to reflect underlying risk. The lower prices give investors greater upside as compensation for bearing this risk.” (http://www.dfaus.com/philosophy/dimensions.html)

- Maybe value is mispricing
  - People like “glamourous” stocks?
  - Lakonishok, Shleifer, Vishy argue it is mispricing
    - LSV: “The fundamental premise on which our investment philosophy is based is that superior long-term results can be achieved by systematically exploiting the judgmental biases and behavioral weaknesses that influence the decisions of many investors.” (http://www.lsvasset.com/about/about.html)

The case for risk

- Fama & French in several subsequent studies have argued that high B/M stocks are riskier, or “marginal” firms and that the CAPM is too simple, “CAPM is dead”
- Firms with low market value relative to their BE are firms that the market perceives to have poor growth opportunities.
  - They are more sensitive to the business cycle
  - Investors require a higher rate of return for these risky securities.

The case for glamour

- Lakonishok, Shleifer, Vishny (1994)

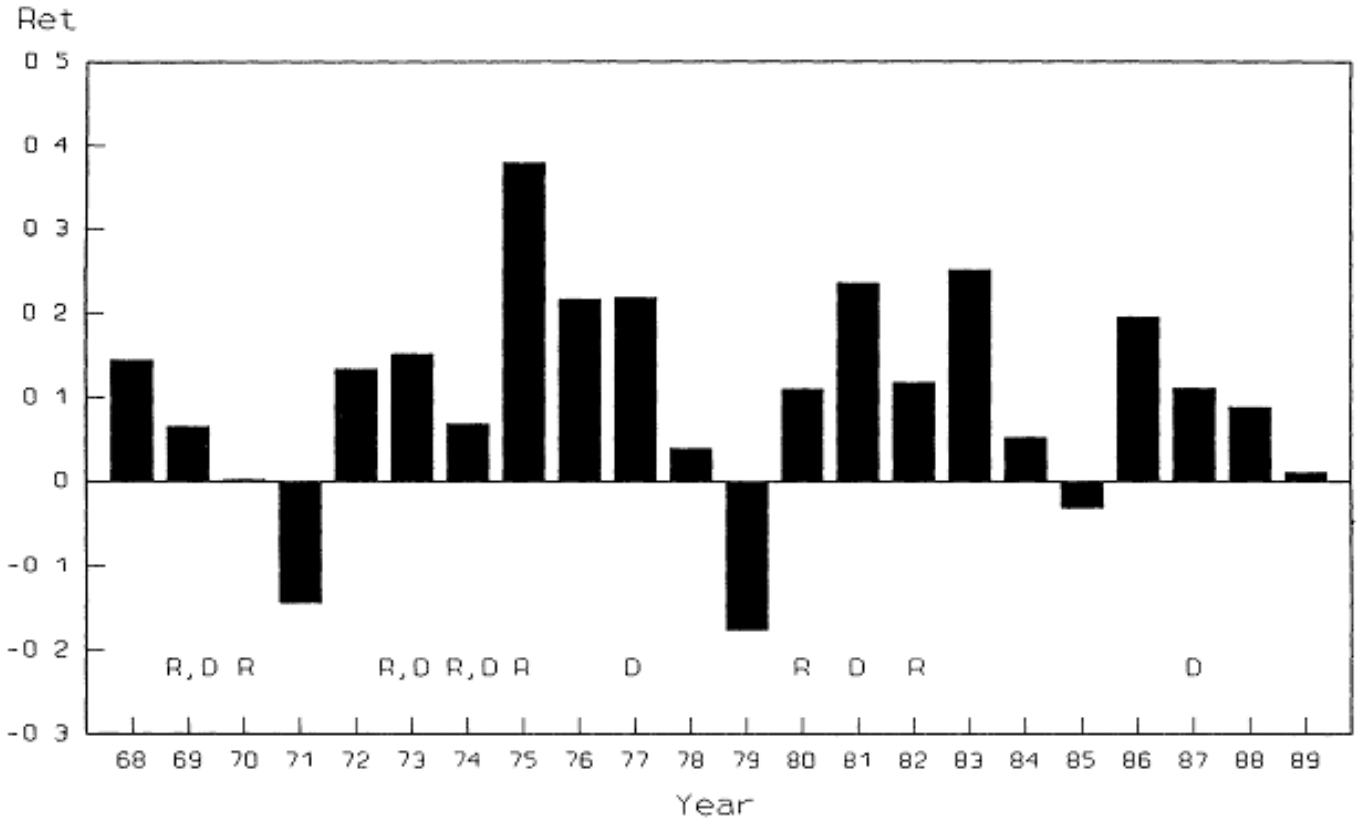
	Panel 1	
	Glamour B/M_1	Value B/M_{10}
Panel B: Past Performance—Growth Rates and Past Returns		
$AEG_{(-5,0)}$	0.309	−0.274
$ACG_{(-5,0)}$	0.217	−0.013
$ASG_{(-5,0)}$	0.091	0.030
$RETURN_{(-3,0)}$	1.455	−0.119
Panel C: Future Performance		
$AEG_{(0,5)}$	0.050	0.436
$ACG_{(0,5)}$	0.127	0.070
$ASG_{(0,5)}$	0.062	0.020
$AEG_{(2,5)}$	0.070	0.215
$ACG_{(2,5)}$	0.086	0.111
$ASG_{(2,5)}$	0.059	0.023

Are value strategies risky? (LSV ’94)

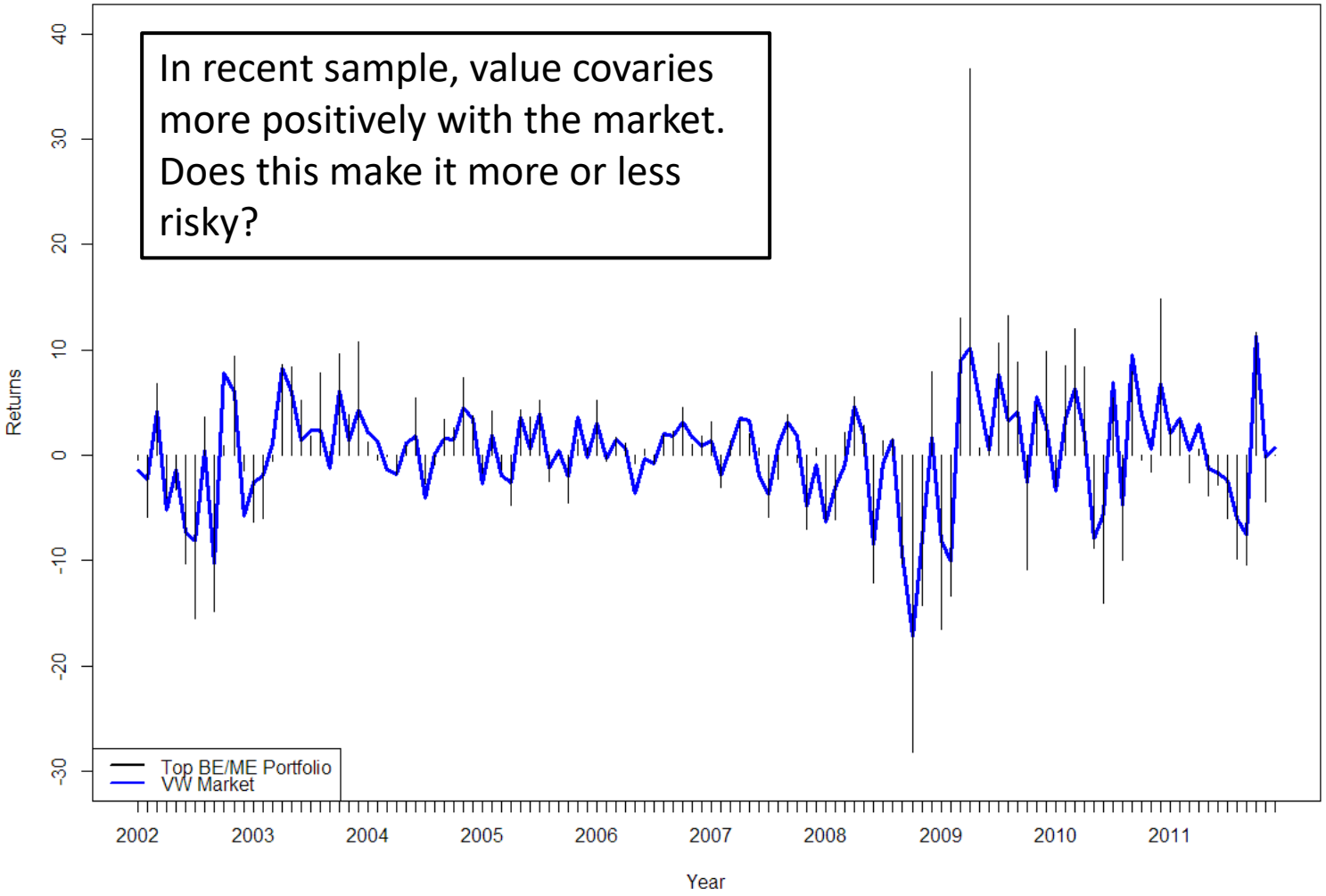
- Remember, risk is when $cov(returns, wealth) > 0$

R = Recession
D = Mkt < 0

LSV ’94 argues that value *does not* perform poorly in bad times, so it is not risk.



Value in last ~10 years



Is value risk or mispricing?

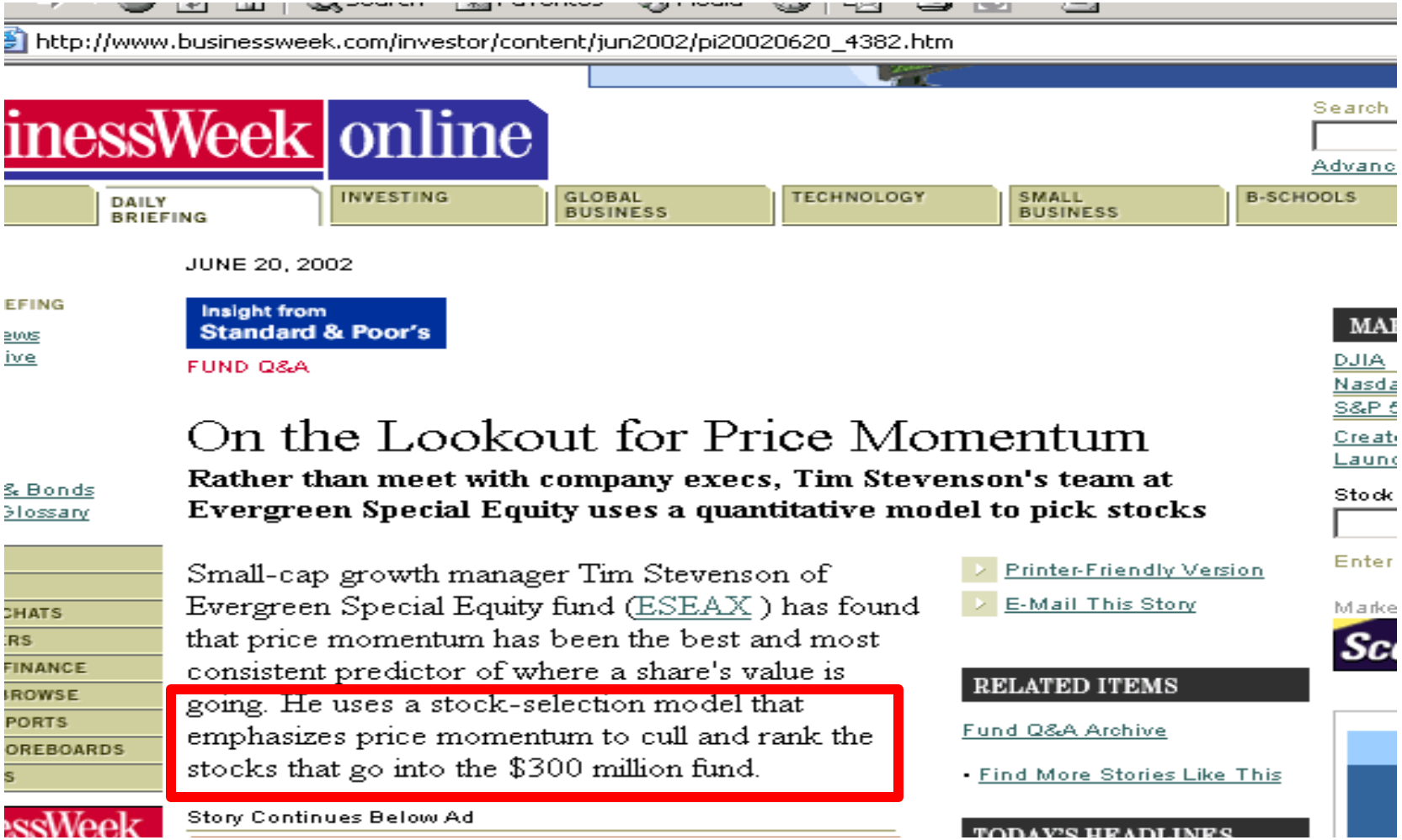
- Strong debate on both sides.
- No clear answer.
- Recently, value looks more risky.
  - Effect of quant funds following value more?
- Conclusion left to the reader.
  - But if you try to trade value, remember it is mostly in very small-cap stocks.

“Drifts”

- Other things that explain returns
  - Momentum
  - Post-earnings Announcement Drift
  - Delayed reaction to news
  - Equity issuance

- All potentially related to an underreaction story

Momentum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Insight from Standard & Poor's
FUND Q&A
On the Lookout for Price Momentum
Rather than meet with company execs, Tim Stevenson's team at Evergreen Special Equity uses a quantitative model to pick stocks
Small-cap growth manager Tim Stevenson of Evergreen Special Equity fund (ESEAX) has found that price momentum has been the best and most consistent predictor of where a share's value is going. He uses a stock-selection model that emphasizes price momentum to cull and rank the stocks that go into the $300 million fund.
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Buying Winners & Selling Losers

- Jegadeesh & Titman (1993) studied a portfolio investment strategy that exploits lagged adjustment of stock prices to information
- Each month from 1964-89, 5400 NYSE stocks sorted into past winners/loser deciles by their recent 3-, 6-, 9- and 12-month performance & winner-net-of-loser portfolios held for next 3- to 12-months
- They found spread returns of 12% - 15% on average over the entire sample

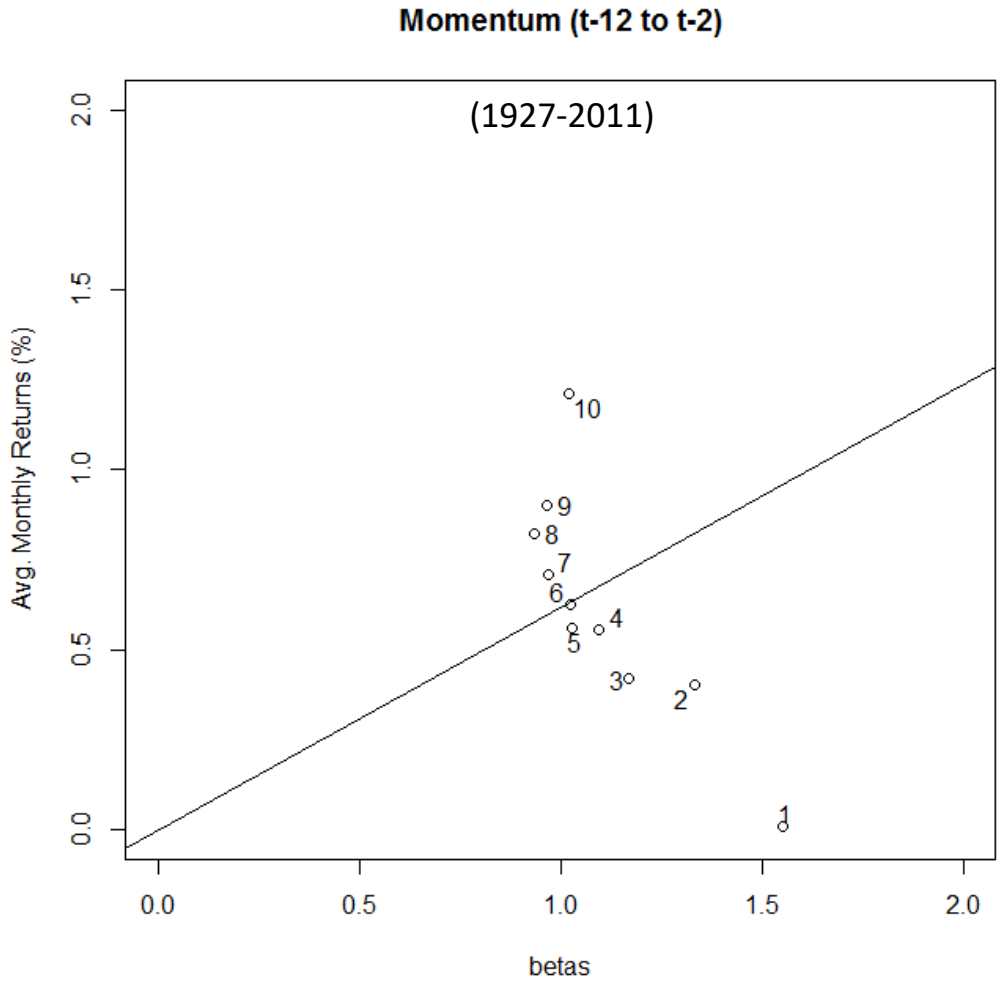
Momentum Investing

- What? Continuation in stock returns:
  - Prior winners continue to outperform prior losers

- Why? Leading suspects investigated to date:
  - Data Mining: special artifact of U.S. data
  - Risk: momentum returns are reward for priced risk
  - Behavioral Patterns: irrational agents induce price patterns

Data Mining?

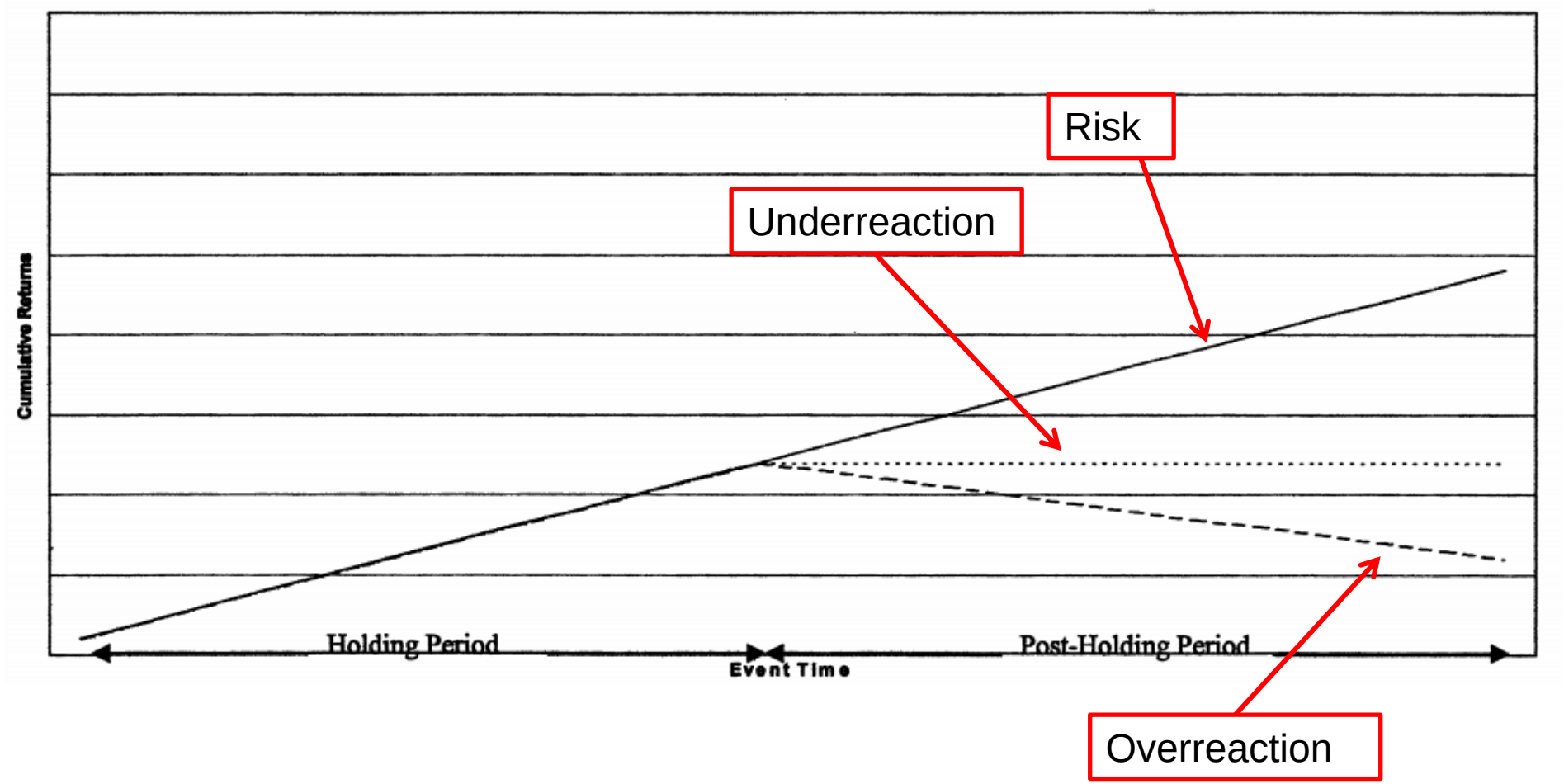
- Has been widely publicized since 1991.
  - (Jegadeesh and Titman (2001))
- What about Internationally? Does momentum persist in other markets?
  - Rouwenhorst (1998), Griffin, Ji, and Martin (2003, 2005), Fama and French (2010)



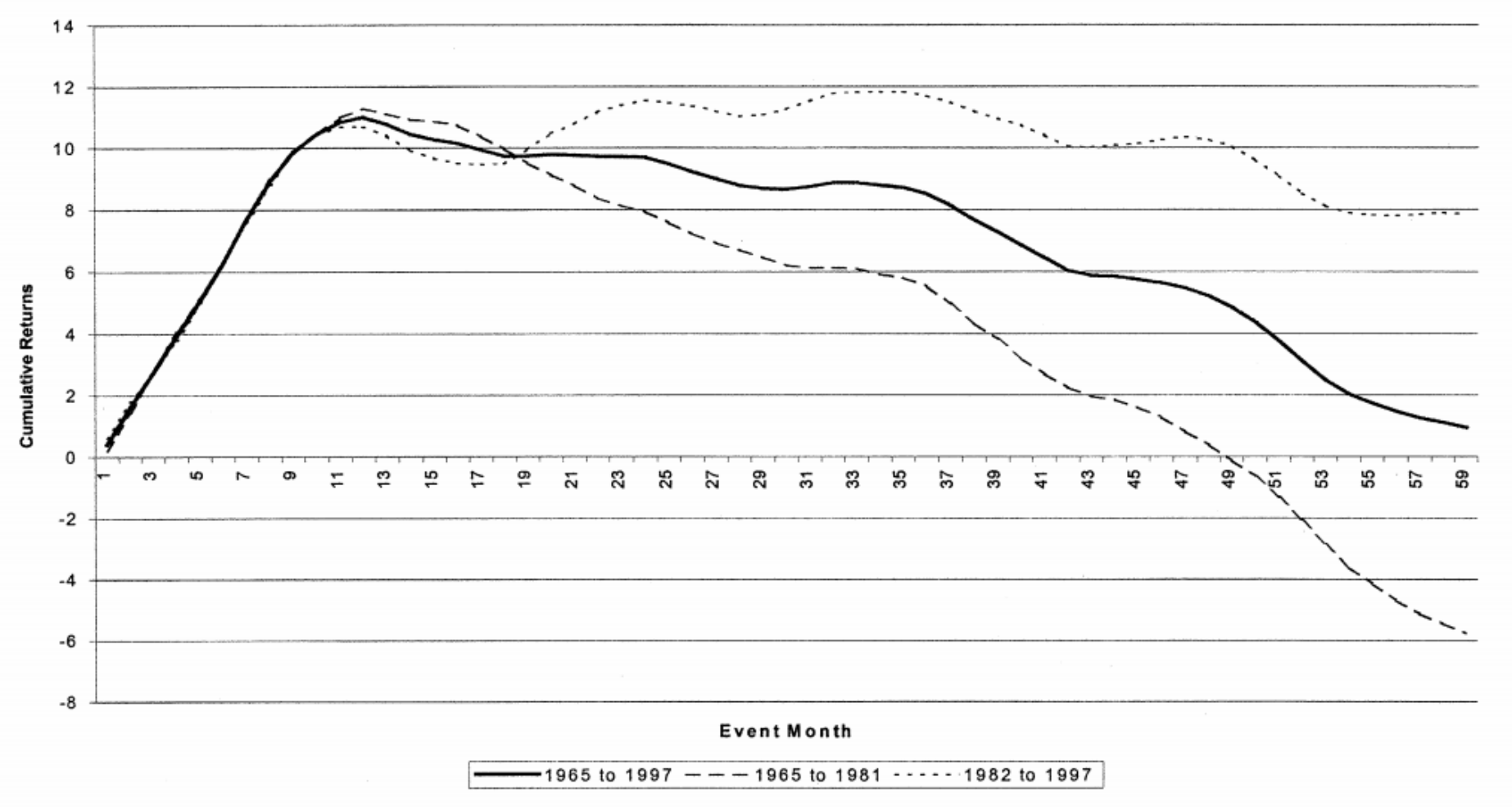
Momentum explanations?

- Data mining? No.
- Risk
  - Assumes stocks that have done well in the past are risky
- Underreaction
  - Assumes stocks have good news, but some investors are slow to react.
- Overreaction
  - Assumes stocks have good news, but some investors overreact, so there's a reversal later.

Further examination (JT 2001)



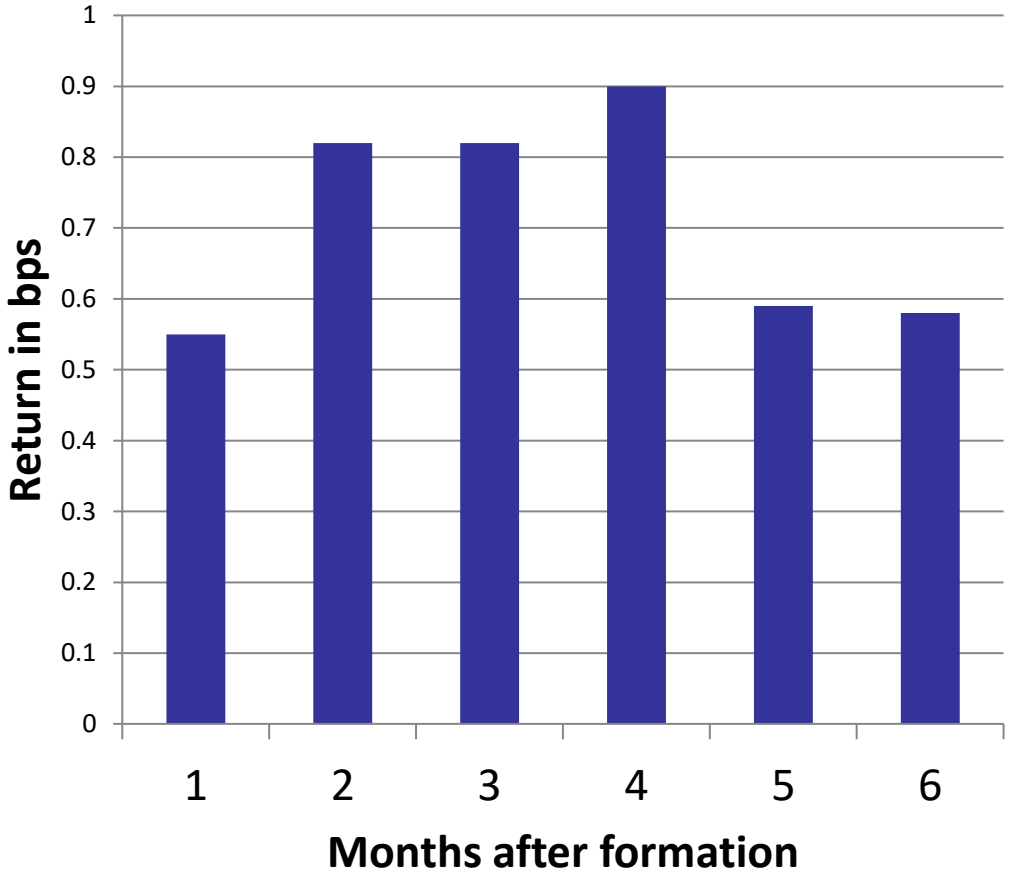
Further examination cont'd (JT 2001)



Underreaction? (JT 1993)

- Rank stocks into winners/losers based on past 6-months stock return.
- Look at winner – loser (WML) returns from days -2 to 0 around earnings announcements made over the next 6 months

- Positive WML returns mean stocks that have done well in the past have more "positive" earnings surprises than those that have done poorly.

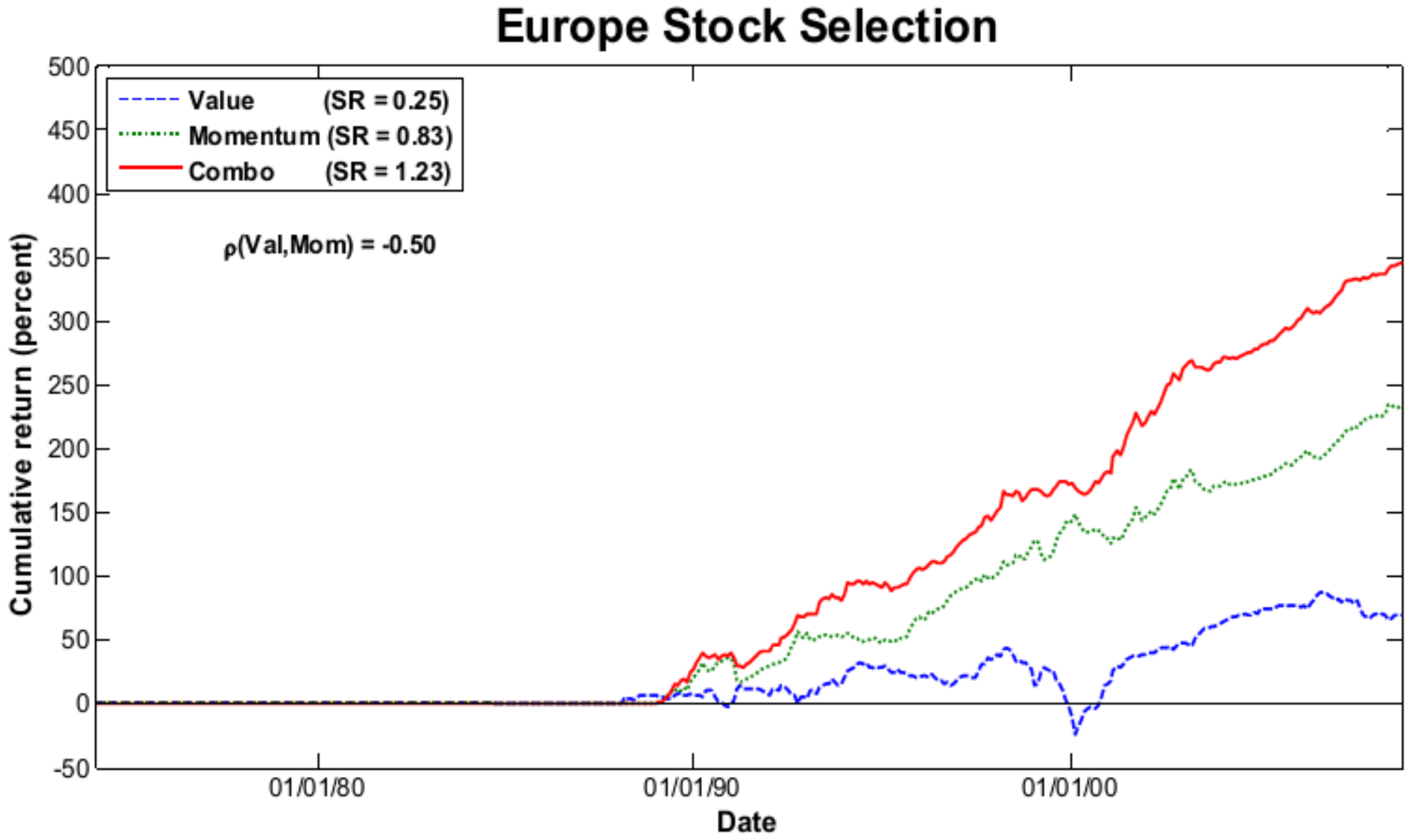


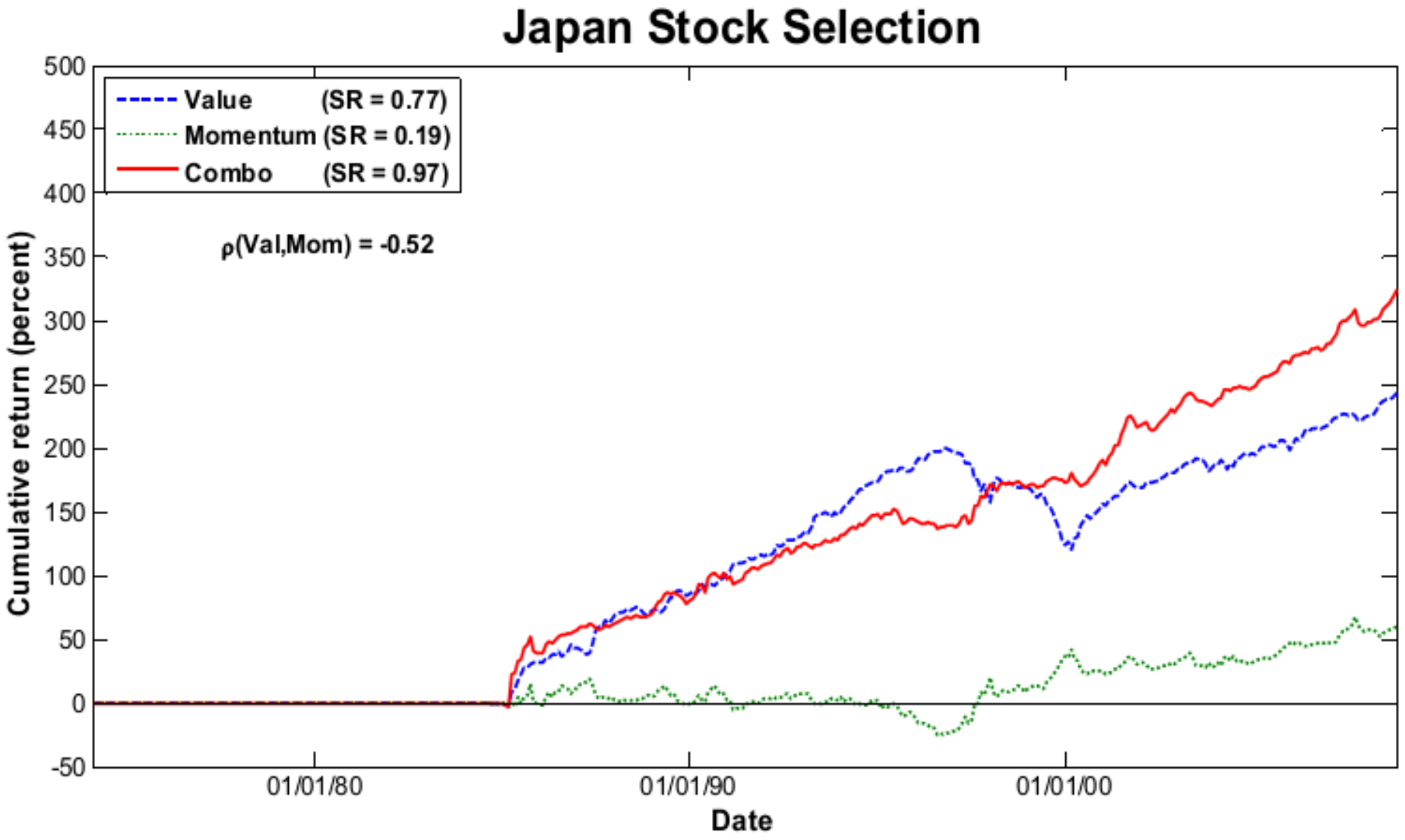
Momentum in many asset classes

- US Equities
  - Jegadeesh and Titman (1993, 2001).
- Developed Equities
  - Rouwenhorst (1998)
- Emerging Equities
  - Rouwenhorst (1999)
- Industries & Firm Specific (Equity)
  - Moskowitz and Grinblatt (1999), Grundy and Martin (2001).
- Country Equity Indices
  - Asness, Liew, and Stevens (1997)
- Currencies
  - Okunev and White (2003)
- Commodities
  - Erb and Harvey (2006)
- Futures
  - Asness, Moskowitz, and Pedersen (2008), Moskowitz, Ooi, and Pedersen (2010)

Momentum and Value Everywhere?

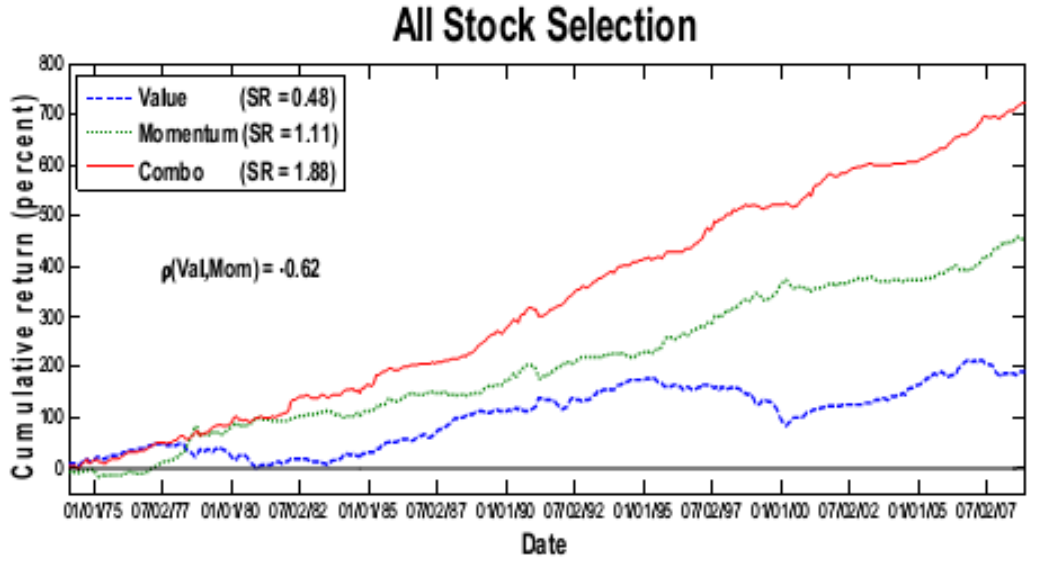
- Asness, Moskowitz, Pedersen 2012
  - We find Value and Momentum in equities
  - What about other asset classes?
  - What happens if we combine the two strategies?
- Their strategies
  - Stock: US, UK, Japan, Europe,
  - Non-stock: Country Index futures, country bonds, currencies, commodities

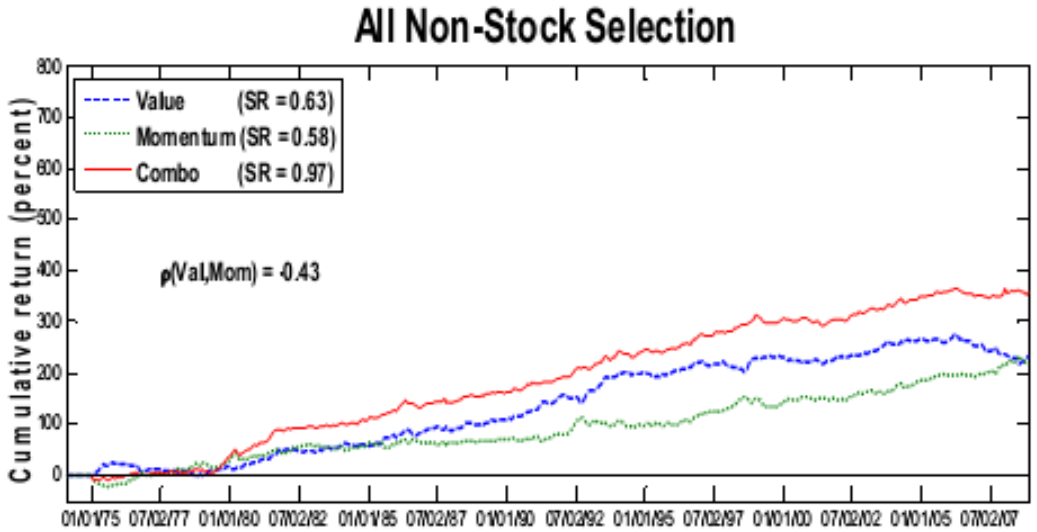

Europe Stock Selection
Value (SR = 0.25)
Momentum (SR = 0.83)
Combo (SR = 1.23)
ρ(Val,Mom) = -0.50
Cumulative return (percent)
500
450
400
350
300
250
200
150
100
50
0
-50
01/01/80
01/01/90
01/01/00
Date


Japan Stock Selection
Value (SR = 0.77)
Momentum (SR = 0.19)
Combo (SR = 0.97)
ρ(Val,Mom) = -0.52
Cumulative return (percent)
500
450
400
350
300
250
200
150
100
50
0
-50
01/01/80
01/01/90
01/01/00
Date

Stock vs. Non-Stock

- Stock: US, UK, Japan, Europe,
- Non-stock: Country Index futures, country bonds, currencies, commodities





Should you trade on this?

- Sharpe Ratios of all asset strategies
  - Value: 0.63
  - Momentum: 0.94
  - Combo: 1.89

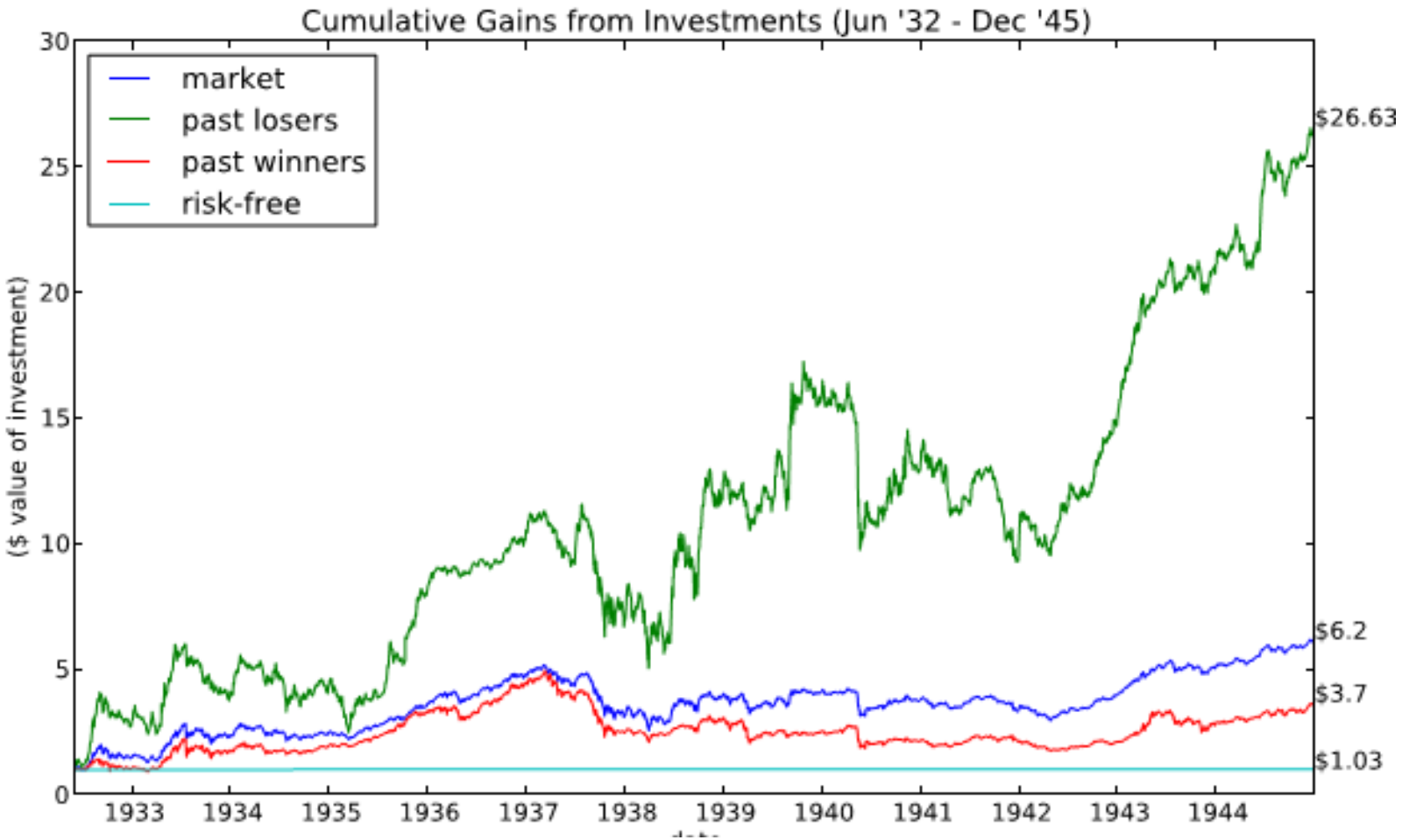
- Explanations? Risks?

Momentum Crashes

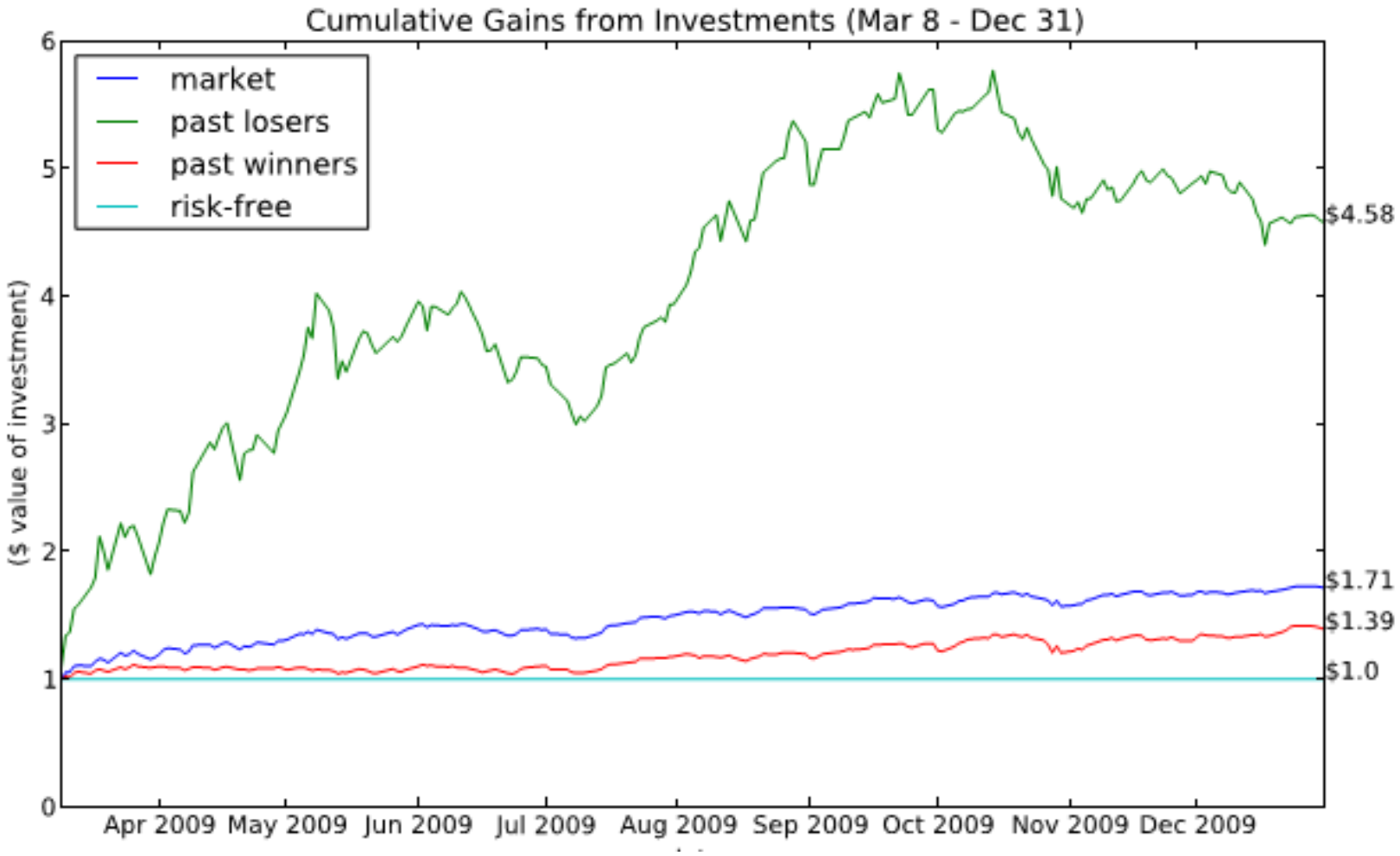
- Daniel (2010); Daniel, Jagannathan, Kim (2012)
  - Momentum “blows up” during down markets

- Reasons?
  - Quants all rush for the exits at the same time?
  - The firms in the winner/loser portfolios are different during momentum crashes?

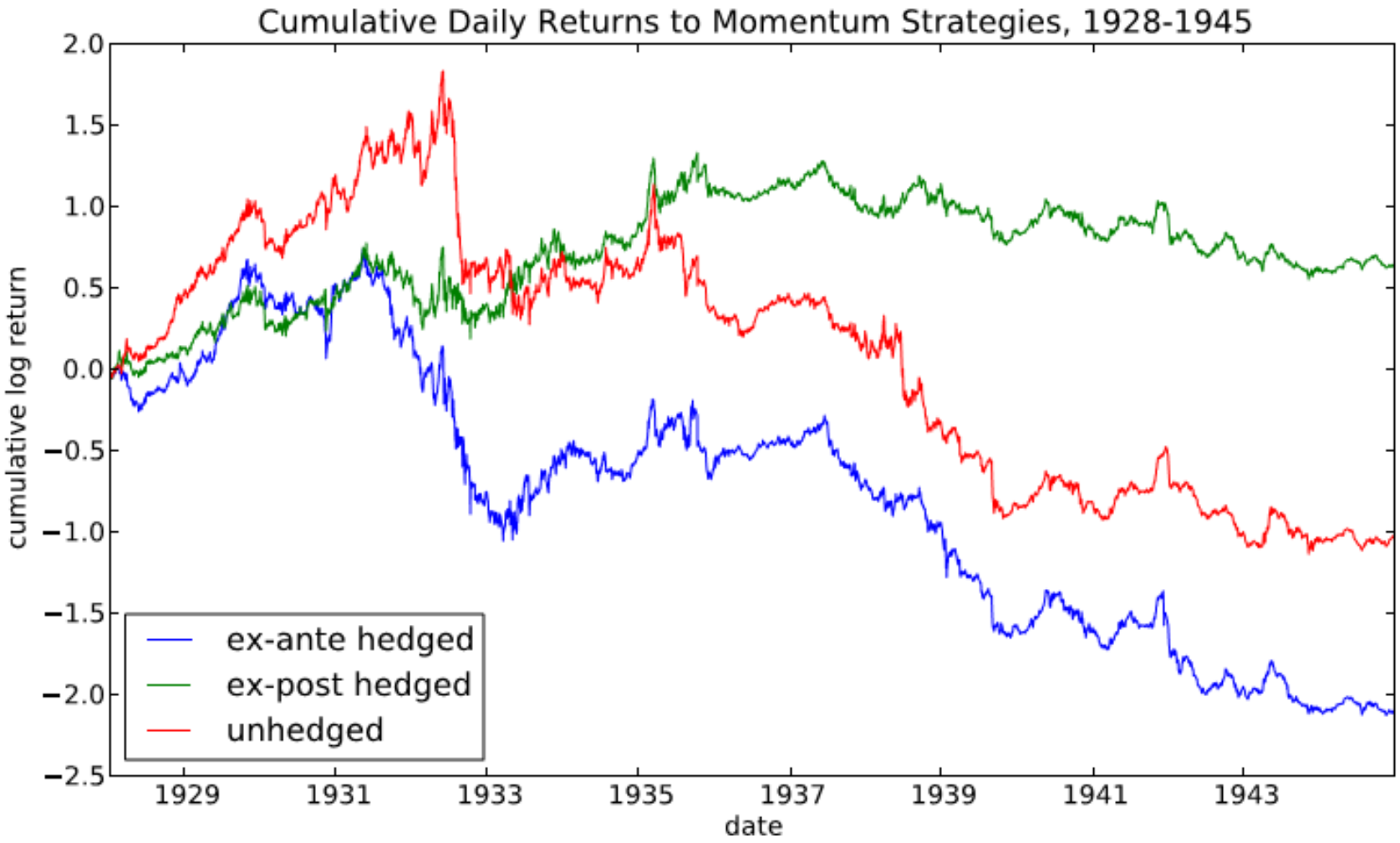
Momentum during the Depression



Momentum during Financial Crisis



Can we just hedge this risk?



Momentum Summary

- Historically Momentum has done great
  - (up to 12% per year)
- Most agree it does not relate to standard notions of systematic risk
  - But it is not riskless in the sense of being a sure thing.
- There are some behavioral explanations
  - But no consensus on these either
- Industry knows not to ignore momentum, but most secretly admit that they don't fully understand it either.

Summary

- Is beta risk?
  - Historically, no.
  - Going forward? Not clear.
- Several “anomalies” that seem to explain returns
  - Small-cap stocks have higher returns
  - Value stocks have higher returns
  - High price-momentum stocks have higher returns
- Risk or mispricing?
  - If it is risk, it will continue to exist.
  - If it is mispricing, we expect it to go away.